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Hurricane Preparedness Week: Storm Surge

During Hurricane Preparedness Week 2013 the Central Pacific Hurricane Center will share a series of statements regarding tropical cyclones and their various threats to the State of Hawaii. Today's topic: Storm Surge.

Storm surge is simply water that is pushed toward the shore by the force of the winds swirling around a tropical cyclone. This advancing surge combines with the normal tides to create the hurricane storm tide, which can increase the mean water level by several feet or more. In addition, wind driven waves are superimposed on the storm tide. This rise in water level can cause severe flooding in coastal areas, particularly when the storm tide coincides with the normal high tides.

The level of surge in a particular area is also determined by the slope of the ocean surface below the surface of the ocean. A shallow slope off the coast will allow a greater surge to inundate coastal communities. Communities with a steeper continental shelf, as in Hawaii, will not see as much surge inundation, although large breaking waves can still present major problems. Storm tides, waves, and currents in confined harbors severely damage ships, marinas, and pleasure boats.

In general, the more intense the storm, and the closer a community is to the right-front quadrant, the larger the area that must be evacuated. The problem is always the uncertainty about how intense the storm will be when it finally makes landfall. Emergency managers and local officials balance that uncertainty with the human and economic risks to their community. This is why a rule of thumb for emergency managers is to plan for a storm one category higher than what is forecast. This is a reasonable precaution to help minimize the loss of life from hurricanes.

Wave and current action associated with the tide also causes extensive damage. Water weighs approximately 1,700 pounds per cubic yard; extended pounding by frequent waves can demolish any structure not specifically designed to withstand such forces.

Southern coastlines of the Hawaiian Islands face a very significant risk where a majority of residents reside. During Hurricane Iniki in 1992, dozens of homes were damaged or destroyed by storm surge.